



ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION & BEAR REHABILITATION GUIDELINES

Dr. Ed Tingstad
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PHASE 0: Pre-Operative Recommendations

Goals	<input type="checkbox"/> Normal Gait <input type="checkbox"/> AROM 0 -120 <input type="checkbox"/> Minimal effusion <input type="checkbox"/> Strength: 20 SLR with no lag <input type="checkbox"/> Patient education on post-op exercises and need for compliance
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General Guidelines: The following **ACL reconstruction** and **BEAR rehabilitation** guidelines are based on a review of the randomized controlled trials related to ACL rehabilitation. For many aspects of ACL rehabilitation there are either no studies that qualify as “best evidence” or the number of studies is too few for conclusions to be drawn with confidence. In these circumstances, the recommendations are based upon the guidance of the MOON panel of content experts.

The guidelines have been developed to service the spectrum of ACL injured people (non-athlete to elite athlete). For this reason, **example exercises** are provided instead of a highly structured rehabilitation program. **Attending rehabilitation specialists should tailor the program to each patient’s specific needs.**

The multicenter nature of the MOON group necessitates that the MOON ACL Rehabilitation Program only include treatment methods that can be employed at all sites without purchasing expensive equipment. Consequently, some treatment methods with supporting evidence (e.g. using a high intensity electric stimulation training program for strength, aquatic therapy) are not included in the program because the expert panel believed that it is unreasonable to expect all sites to carry out such treatments.

Progression from one phase to the next is based on the patient demonstrating readiness by achieving **functional criteria rather than the time elapsed since surgery**. The timeframes identified in parentheses after each phase are approximate times for the average patient, **NOT** guidelines for progression. Some patients will be ready to progress sooner than the timeframe identified, whereas others will take longer. Your surgeon may also provide specific individual instructions that take precedence over the general protocol. Please note your surgeon may also provide specific individual instructions that take precedence over this generalize protocol.

The protocol below is for patients who have undergone ACL graft reconstruction surgery as well as those who have undergone the BEAR ACL repair surgery. **Each surgery has a corresponding Phase 1 tailored to specific guidelines. Phases 2-5 are the same for both traditional ACL reconstruction patients and BEAR ACL repair patients.**

If there are any questions regarding the MOON ACL rehabilitation guidelines, please send a MyChart message or contact our office at (509) 332-2828.



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PHASE 1: BEAR ACL Repair Immediate Post-Op (Surgery – 4 Weeks)							
Goals	<ul style="list-style-type: none"> <input type="checkbox"/> Full knee extension <input type="checkbox"/> Good quadriceps control <input type="checkbox"/> Minimize pain 						
Crutches	<ul style="list-style-type: none"> <input type="checkbox"/> Bracing locked at 0° and touchdown weightbearing from weeks 0-2. <input type="checkbox"/> Gradual transition to weightbearing as tolerated by week 3 <input type="checkbox"/> Brace may be discontinued at the 4 week mark post-operatively 						
Cryotherapy	<ul style="list-style-type: none"> <input type="checkbox"/> Cold with compression and elevation <input type="checkbox"/> First 24 hours: ice every hour for 25 minutes <input type="checkbox"/> After 24 hours: ice 3 times daily for at least 15 minutes 						
Exercises	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; text-align: center; vertical-align: middle;">ROM</td> <td> <ul style="list-style-type: none"> <input type="checkbox"/> Weeks 0-2: 0°- 30° <input type="checkbox"/> Weeks 2-4: 0°- 45° <input type="checkbox"/> Weeks 4-6: Progress ROM as tolerated <input type="checkbox"/> Extension: low load, long duration stretching <ul style="list-style-type: none"> <input type="checkbox"/> Heel prop <input type="checkbox"/> Flexion: low load, long duration stretching <ul style="list-style-type: none"> <input type="checkbox"/> Wall/heel slides, Seated assisted knee flexion <input type="checkbox"/> Patellar mobilization: medial and lateral initially, then superior and inferior </td> </tr> <tr> <td style="text-align: center; vertical-align: middle;">MUSCLE ACTIVATION</td> <td> <ul style="list-style-type: none"> <input type="checkbox"/> Quad sets emphasizing VMO and vastus lateralis <input type="checkbox"/> Straight leg raises with brace until there is no lag <input type="checkbox"/> Side lying adduction/abduction <input type="checkbox"/> Prone hip extension <input type="checkbox"/> Ankle pumps with TheraBand and heel raises </td> </tr> <tr> <td style="text-align: center; vertical-align: middle;">CARDIOVASCULAR</td> <td> <ul style="list-style-type: none"> <input type="checkbox"/> Upper body circuit training or upper body ergometer </td> </tr> </table>	ROM	<ul style="list-style-type: none"> <input type="checkbox"/> Weeks 0-2: 0°- 30° <input type="checkbox"/> Weeks 2-4: 0°- 45° <input type="checkbox"/> Weeks 4-6: Progress ROM as tolerated <input type="checkbox"/> Extension: low load, long duration stretching <ul style="list-style-type: none"> <input type="checkbox"/> Heel prop <input type="checkbox"/> Flexion: low load, long duration stretching <ul style="list-style-type: none"> <input type="checkbox"/> Wall/heel slides, Seated assisted knee flexion <input type="checkbox"/> Patellar mobilization: medial and lateral initially, then superior and inferior 	MUSCLE ACTIVATION	<ul style="list-style-type: none"> <input type="checkbox"/> Quad sets emphasizing VMO and vastus lateralis <input type="checkbox"/> Straight leg raises with brace until there is no lag <input type="checkbox"/> Side lying adduction/abduction <input type="checkbox"/> Prone hip extension <input type="checkbox"/> Ankle pumps with TheraBand and heel raises 	CARDIOVASCULAR	<ul style="list-style-type: none"> <input type="checkbox"/> Upper body circuit training or upper body ergometer
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CARDIOVASCULAR	<ul style="list-style-type: none"> <input type="checkbox"/> Upper body circuit training or upper body ergometer 						
Progression Criteria	<ul style="list-style-type: none"> <input type="checkbox"/> Crutches and brace are discontinued <input type="checkbox"/> 20 SLR without a lag 						



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PHASE 1: ACL Graft Reconstruction Immediate Post-Op (Surgery – 2 Weeks)		
Goals	<ul style="list-style-type: none"> <input type="checkbox"/> Full knee extension <input type="checkbox"/> Good quadriceps control <input type="checkbox"/> Minimize pain <input type="checkbox"/> Normal gait pattern 	
Crutches	<ul style="list-style-type: none"> <input type="checkbox"/> Weight bearing as tolerated beginning the day of surgery <input type="checkbox"/> Can discontinue use of crutches if the patient is able to have a normal gait pattern, can ascend and descend stairs without pain or instability <input type="checkbox"/> Patient does NOT require a knee immobilizer 	
Cryotherapy	<ul style="list-style-type: none"> <input type="checkbox"/> Cold with compression and elevation <input type="checkbox"/> First 24 hours: ice every hour for 25 minutes <input type="checkbox"/> After 24 hours: ice 3 times daily for at least 15 minutes 	
Exercises	ROM	<ul style="list-style-type: none"> <input type="checkbox"/> Extension: low load, long duration stretching <ul style="list-style-type: none"> ○ Heel prop and Prone hang <input type="checkbox"/> Flexion: low load, long duration stretching <ul style="list-style-type: none"> ○ Wall/heel slides, Seated assisted knee flexion, Bike riding <input type="checkbox"/> Patellar mobilization: medial and lateral initially, then superior and inferior
	MUSCLE ACTIVATION	<ul style="list-style-type: none"> <input type="checkbox"/> Quad sets emphasizing VMO and vastus lateralis <input type="checkbox"/> Straight leg raises emphasizing no lag <input type="checkbox"/> Double leg quarter squats <input type="checkbox"/> Standing TheraBand resisted terminal knee extensions (TKA) <input type="checkbox"/> Hamstring curls, hamstring sets <input type="checkbox"/> Side lying adduction/abduction <input type="checkbox"/> Quad/hamstring co-contraction supine <input type="checkbox"/> Prone hip extension <input type="checkbox"/> Ankle pumps with TheraBand and heel raises
	CARDIOVASCULAR	<ul style="list-style-type: none"> <input type="checkbox"/> Upper body circuit training or upper body ergometer
Progression Criteria	<ul style="list-style-type: none"> <input type="checkbox"/> Crutches and immobilizers are discontinued <input type="checkbox"/> Normal gait pattern <input type="checkbox"/> ROM: no greater than 5-degree active extension leg and 110 degrees of flexion <input type="checkbox"/> 20 no lag SLR 	



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PHASE 2: Early Rehabilitation (Weeks 2 - 6)	
Goals	<input type="checkbox"/> Full ROM <input type="checkbox"/> Improved muscle strength <input type="checkbox"/> Progress neuromuscular retraining
Cryotherapy	<input type="checkbox"/> Continue with cryotherapy as needed
Exercises	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%; text-align: center;">ROM</div> <div style="width: 80%;"> <input type="checkbox"/> Extension: low load, long duration stretching <ul style="list-style-type: none"> ○ Heel prop ○ Prone hand <input type="checkbox"/> Flexion: low load, long duration stretching <ul style="list-style-type: none"> ○ Wall/heel slides ○ Seated assisted knee flexion ○ Bike riding ○ Rocking <input type="checkbox"/> Patellar mobilization: medial and lateral initially, then superior and inferior </div> </div>
	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%; text-align: center;">MUSCLE ACTIVATION</div> <div style="width: 80%;"> <input type="checkbox"/> Quad sets emphasizing VMO and vastus lateralis <input type="checkbox"/> Mini squats/wall squats <input type="checkbox"/> Step-ups <input type="checkbox"/> Leg press or shuttle (NO JUMP) <input type="checkbox"/> Hamstring curls <input type="checkbox"/> Resistive SLR with sports cord <input type="checkbox"/> Hip adduction/abduction <input type="checkbox"/> Standing heel raises: double to single <input type="checkbox"/> Seated calf press <input type="checkbox"/> Multi-hip machine in all directions </div> </div>
	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%; text-align: center;">CARDIOVASCULAR</div> <div style="width: 80%;"> <input type="checkbox"/> Bike, elliptical, stair master </div> </div>
Progression Criteria	<input type="checkbox"/> Full ROM <input type="checkbox"/> Minimal effusion/pain <input type="checkbox"/> Functional strength and control in daily activities <input type="checkbox"/> IKDC Question #10 score of >7



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PHASE 3: Strengthening and Control (weeks 7-12)		
Goals	<input type="checkbox"/> Maintain full ROM <input type="checkbox"/> Running without pain or swelling <input type="checkbox"/> Hopping without pain, swelling, or giving way	
Exercises	STRENGTH	<input type="checkbox"/> Squats <input type="checkbox"/> Leg press <input type="checkbox"/> Hamstring curls <input type="checkbox"/> Knee extension 90 to 0 degrees <input type="checkbox"/> Step-ups and downs <input type="checkbox"/> Lunges <input type="checkbox"/> Shuttle <input type="checkbox"/> Sports cod <input type="checkbox"/> Wall squats
	NEUROMUSCULAR TRAINING	<input type="checkbox"/> Wobble board/rocker board <input type="checkbox"/> Perturbation training <input type="checkbox"/> Instrumented testing systems <input type="checkbox"/> Varied surfaces
	CARDIOVASCULAR	<input type="checkbox"/> Straight line running on a treadmill or in a protected environment (NO cutting or pivoting) <input type="checkbox"/> All other cardio equipment
Progression Criteria	<input type="checkbox"/> Running without pain or swelling <input type="checkbox"/> Hopping without pain or swelling (bilateral and unilateral) <input type="checkbox"/> Neuromuscular and strength training exercises without difficulty	



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PHASE 4: Advanced Training (weeks 13-16)		
Goals	<ul style="list-style-type: none"> <input type="checkbox"/> Running patterns (figure 8, pivot drills) at 75% speed without difficulty <input type="checkbox"/> Jumping without difficulty <input type="checkbox"/> Hop tests at 75% contralateral values (Cincinnati hop tests: single leg hop for distance, triple hop for distance, crossover hop for distance, 6 meter timed hop) 	
Exercises	AGGRESSIVE STRENGTHENING	<ul style="list-style-type: none"> <input type="checkbox"/> Squats <input type="checkbox"/> Leg press <input type="checkbox"/> Hamstring curls <input type="checkbox"/> Step-ups and downs <input type="checkbox"/> Lunges <input type="checkbox"/> Shuttle
	AGILITY DRILLS	<ul style="list-style-type: none"> <input type="checkbox"/> Shuffling <input type="checkbox"/> Hopping <input type="checkbox"/> Carioca <input type="checkbox"/> Vertical jumps <input type="checkbox"/> Running patterns at 50-75% speed <input type="checkbox"/> Initial sports specific drill patterns at 50-75% effort
	NEUROMUSCULAR TRAINING	<ul style="list-style-type: none"> <input type="checkbox"/> Wobble board/rocker board <input type="checkbox"/> Perturbation training <input type="checkbox"/> Instrumented testing systems
	CARDIOVASCULAR	<ul style="list-style-type: none"> <input type="checkbox"/> Straight line running on a treadmill or in a protected environment (NO cutting or pivoting) <input type="checkbox"/> All other cardio equipment
Progression Criteria	<ul style="list-style-type: none"> <input type="checkbox"/> Maximum vertical jump without pain or instability <input type="checkbox"/> 75% of contralateral on hip tests <input type="checkbox"/> Figure 8 run at 75% speed without difficulty <input type="checkbox"/> IKDC Question #10 score of >8 	



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PHASE 5: Return to Sport (weeks 17-20)		
Goals	<ul style="list-style-type: none"> <input type="checkbox"/> 85% contralateral strength <input type="checkbox"/> 85% contralateral on hop tests <input type="checkbox"/> Sport specific training without pain, swelling, or difficulty 	
Exercises	AGGRESSIVE STRENGTHENING	<ul style="list-style-type: none"> <input type="checkbox"/> Squats <input type="checkbox"/> Leg press <input type="checkbox"/> Hamstring curls <input type="checkbox"/> Step-ups and downs <input type="checkbox"/> Lunges <input type="checkbox"/> Shuttle
	SPORT SPECIFIC ACTIVITIES	<ul style="list-style-type: none"> <input type="checkbox"/> Interval training programs <input type="checkbox"/> Running patterns in football <input type="checkbox"/> Kicking in soccer <input type="checkbox"/> Spiking and hitting in volleyball <input type="checkbox"/> Pivot and drive in basketball <input type="checkbox"/> Sprinting <input type="checkbox"/> Change of direction <input type="checkbox"/> Skill/biomechanical analysis with coaches and sports med team
Return to Sport Evaluation Recommendations	<ul style="list-style-type: none"> <input type="checkbox"/> Hop tests <input type="checkbox"/> Isokinetic strength test <input type="checkbox"/> Vertical Jump <input type="checkbox"/> Deceleration shuttle test <input type="checkbox"/> MOON outcomes measure packer (mandatory; should be completed post-testing) 	
Return to Sport Criteria	<ul style="list-style-type: none"> <input type="checkbox"/> No functional complaints <input type="checkbox"/> Confidence when running, cutting, jumping at full speed <input type="checkbox"/> 85% contralateral values on hop tests <input type="checkbox"/> IKDC Question #10 score of >9 	

*These guidelines are adapted from the Multicenter Orthopaedics Outcomes Network and the following institutions: Cleveland Clinic, Hospital for Special Surgery, Ohio State University, University of Colorado, University of Iowa, Vanderbilt University, and University of Washington